Algebra II Name_____

Inverse and Joint Variation

Does the data in the table suggest that y varies inversely as x? If so, find the constant of variation and the equation.

1.

x	1	2	3	6	12
y	6	3	2	1	$\frac{1}{2}$

_____

2.

x	40	20	10	8	4
y	1	2	4	5	10

_____

State whether each formula expresses inverse variation or joint variation, and state the constant of variation.

3. $E = \frac{360}{n}$ _____ 4. $S = \frac{1}{2}gt^2$ _____ 5. $12 = bh$ _____

In Exercises 6–7, y varies inversely as x.

6. If $y = 6$ when $x = 2$, find y when $x = 4$. _____

7. If $y = 5$ when $x = 2$, find y when $x = 6$. _____

In Exercises 8–9, x varies inversely as y^2.

8. If $x = 9$ when $y = 2$, find x when $y = 3$. _____

9. If $x = 4$ when $y = 5$, find y when $x = 2$. _____

In Exercises 10–11, z varies jointly as x and y.

10. If $z = 18$ when $x = 2$ and $y = 9$, find z when $x = 3$ and $y = 9$. _____

11. If $z = 60$ when $x = 6$ and $y = 8$, find z when $x = 10$ and $y = 12$. _____

In Exercises 12–13, use k as the constant of variation and write an equation for the variation.

12. The area A of a triangle varies jointly as its height h and its base b. _____

13. r varies jointly as s and t and inversely as the cube of v. _____

State whether each equation represents inverse variation, joint variation, or combined variation.

1. $xy = 2$ 2. $z = kxy$ 3. $y = \frac{x}{z}$

4. $t = k\frac{r^2}{s}$ 5. $V = \frac{1}{3}\pi r^2 h$ 6. $F = kdg^2$

7. If z varies inversely as t, and $t = 10$ when $z = 4$, find the constant of variation and write an equation for the variation.

8. If r varies inversely as s, and $s = 4$ when $r = 12$, find s when $r = 6$.

9. If x varies jointly as y and the square of z, and $x = 15$ when $y = 5$ and

PRACTICE EXERCISES

Does the data in the table suggest that y varies inversely as x? If so, find the constant of variation and the equation.

1.

x	1	2	4	8	12
y	4	2	1	$\frac{1}{2}$	$\frac{1}{3}$

2.

x	50	25	20	10
y	2	4	5	10

State whether the formula expresses inverse variation, joint variation, or neither. State the constant of variation.

3. $V = e^3$

4. $24 = lw$

5. $xy = 18$

6. $p = 3s$

7. $V = \pi r^2 h$

8. $A = \frac{1}{2}bh$

In Exercises 9–12, y varies inversely as x.

9. If $y = 4$ when $x = 2$, find y when $x = 6$.

10. If $y = 8$ when $x = 3$, find y when $x = 12$.

11. If $y = 20.4$ when $x = -6.8$, find x when $y = 47.6$.

12. If $y = 82.0$ when $x = 32.8$, find x when $y = 180.4$.

In Exercises 13–16, x varies inversely as y^2.

13. If $x = 4$ when $y = 2$, find x when $y = 3$.

14. If $x = 6$ when $y = 4$, find x when $y = 8$.

15. If $x = 42$ when $y = 21$, find y when $x = 378$.

16. If $x = 72$ when $y = 27$, find y when $x = 54$.

In Exercises 17–22, z varies jointly as x and y.

17. If $z = 12$ when $x = 3$ and $y = 4$, find z when $x = 5$ and $y = 6$.

18. If $z = 15$ when $x = 5$ and $y = 2$, find z when $x = 7$ and $y = 4$.

19. If $z = 198$ when $x = 33$ and $y = 9$, find z when $x = 24$ and $y = 36$.

20. If $z = 1088$ when $x = 34$ and $y = 4$, find z when $x = 28$ and $y = 18$.

21. If $z = 1.1$ when $x = 55$ and $y = 2$, find z when $x = 75$ and $y = 3$.

22. If $z = 742.5$ when $x = 33$ and $y = 15$, find z when $x = 12$ and $y = 15$.

In Exercises 23–30, use k as the constant of variation and write an equation for the variation.

23. t varies directly as q and inversely as s.

24. w varies jointly as x and y.

25. r varies directly as the square of t and inversely as the cube of v.

26. g varies jointly as a and b and inversely as the square of c.

27. The weight of an object varies inversely as the square of the distance of the object from the center of the earth.

28. The load that a beam of constant length can support varies jointly as its width and the square of its height.

29. The resistance of a wire to the passage of an electric current varies directly as the length of the wire and inversely as the square of its diameter.

30. The volume of a right circular cylinder varies jointly as its height and the

31. If y varies inversely as x, and $y = 42$ when $x = 3\frac{1}{2}$, find y when $x = 1\frac{2}{5}$.

32. If y varies inversely as the square of x, and $y = 50$ when $x = 4$, find y when $x = 5$.

33. If w varies jointly as x and y, and $w = 28$ when $x = 4$ and $y = 21$, find w when $x = 12$ and $y = 17$.

34. If c varies jointly as d and the square of e, and $c = 30$ when $d = 15$ and $e = 2$, find d when $c = 6$ and $e = 8$.

35. If y varies directly as x and inversely as z, and $y = 49$ when $x = 14$ and $z = 4$, find y when $x = 16$ and $z = 7$.

36. If a varies directly as b and inversely as the square of c, and $a = 46$ when $b = 12$ and $c = 6$, find b when $a = 23$ and $c = 6$.

37. If x varies directly as the square of y, and $x = 4$ when $y = \frac{1}{2}$, find x when $y = \frac{1}{4}$.

38. If a varies jointly as b and c, and $a = 100$ when $b = 10$ and $c = 5$, find c when $a = 150$ and $b = 15$.

39. If d varies jointly as r and t, and $d = 110$ when $r = 55$ and $t = 2$, find r when $d = 40$ and $t = 3$.

40. If y varies directly as x and inversely as z^2, and $x = 48$ when $y = 8$ and $z = 3$, find x when $y = 12$ and $z = 2$.

In Exercises 1–3, y varies inversely as x.

1. If $y = 3$ and $x = 4$, find y when $x = 2$. _____

2. If $y = 1$ and $x = 3$, find x when $y = 6$. _____

3. If $x = 10$ when $y = \frac{1}{2}$, find y when $x = 5$. _____

In Exercises 4–5, y varies jointly as x and z.

4. If $z = 3$ when $x = 3$ and $y = 6$, find y when $x = 2$ and $z = 3$. _____

5. If $y = 2$ when $x = 6$ and $z = 5$, find y when $x = 1$ and $z = 10$. _____